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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/677,545
Filing Date: October 02, 2003
Appellant(s): XU, ERIC CHAO

L. James Ristas
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/24/2008 appealing from the Office action mailed 2/20/2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

There is currently a pending, but as yet undocketed, appeal in related application 10/483,648, which is a National Stage entry for the parent PCT application of the instant case.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct. All claims on appeal have been rejected.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

The Appeal Brief references paragraphs in the published application. Corresponding page and line numbers from the originally filed Specification are as follows:

P 2, line 29 to p 3, line 2 corresponds to published paragraph 8.

P 6, lines 4-6 corresponds to published paragraph 36.

P 6, line 15 to p 9, line 10 corresponds to published paragraphs 39-45.

P 9, line 19 to p 10, line 4 corresponds to published paragraph 47.

P 10, lines 17- 30 corresponds to published paragraph 49.

P 11, line 14 to p 12, line 30 corresponds to published paragraphs 52 and 53.

P 21, lines 21-26 corresponds to published paragraph 91.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

Claims 50-52 were inadvertently omitted in the statement of the first rejection in the outstanding Final Office Action. However, claims 50-52 were addressed in the body of the rejection. Therefore, inclusion of claims 50-52 clearly do not constitute a new grounds of rejection.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

3023140	Textor	2-1962
4270976	Sandstrom et al	6-1981
4486267	Prusas	12-1984
6743332	Haynes et al	6-2004
4040743	Villaume et al	8-1977

Cannell et al "The Future of BCTMP" Pulp and Paper, May 2000, pp 61-76.

Xu, Eric C. "Chemical Treatment in Mechanical Pulping - Part 3; Pulp Yield and Chemical Pretreatment", 1998 Pulping Conference, TAPPI Proceedings, pp. 391- 402.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-11, 18-23, 28-29, 36-38 and 42-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haynes et al (U 6,743,332) in view of Cannell et al ("The Future of BCTMP", Pulp and Paper, May 2000, supplied by applicant) and further in view of Prusas (4,486,267).

Claims 1-4, 8, 18-19, 22-23, 28, 36-37 and 42-43: Haynes et al discloses a method of making bleached mechanical pulps comprising (Abs; col. 5, lines 36-46; col 11, lines 53-64; col 12, lines 1-12; Fig. 2, item 224; col 13, lines 31-36; col 14, line 45 to col 15, line 8, Example 1):

- feeding wood chips, or lignocellulosic material, into a pressure disk refiner (inherently or obviously at an inlet to the refiner);
- refining the pulp at a temperature between 85 and 160 °C at a pressure of about 11 to 40 psi (68.9 to 276 kPa);
- the pulp having a consistency of about 10% to 50%; and
- delivering a stream of refined (primary) pulp from the casing of the refiner to a blow line while the primary pulp temperature is between 85 and 160 °C.

The pressure refiner has a superatmospheric casing to allow operation at elevated pressures. The feed is in the form of wood chips, thus has been previously refined (to form the wood chips).

Multiple alkaline peroxide treatments of the pulp are disclosed, including treatment in the refiner or prior to the refiner (col 12, lines 39-53, Fig. 2, items 260, 261 and 263). In addition, a second alkaline peroxide (intermediate or blow line) solution is mixed with the stream of primary pulp within the intermediate (blow) line while the primary pulp temperature is between 85 and 160 °C (col. 5, lines 12-20 and 36-45; col. 8, lines 10-14, Fig. 2, item 262; col. 12, lines 49-53; col 15, lines 8-10, Example 1) to form a reaction mixture in the intermediate line (col. 5, lines 41-45). Haynes also discloses that the second addition of the alkaline peroxide (intermediate or blow line) solution can be added at vessels, cyclone cleaner, conveyors (Fig 2, blocks 218, 258, 226, 230) and all lines connected to such blocks, including after the primary refiner (blow line) and prior to additional refining (Fig 2, item 262) (col 12, lines 42-62). The components of the bleaching liquor, including the alkaline component can be added concurrently or together as part of the bleaching liquor (col 5, lines 6-12). An inlet port is inherent or, at least, would have been obvious to one of ordinary skill in the art to allow for the addition of treatments. Including a blow valve for discharging the solution from the pressurized refiner into the blow line is also inherent or would also have been obvious. In some embodiments, the reacting mixture having a temperature between 85 and 160 °C is discharged into a retention vessel, such as a surge vessel or a further portion of the blow line after the addition and mixing, (col. 8, lines 10-14) and contact

time in the lines and vessels is controlled (the reaction mixture is retained) to produce a bleached material (col 5, lines 12-20; col. 13, line 64 - col. 14, line 8).

Haynes et al does not disclose the following:

- Feeding a lignocellulosic material into a first press,
- Pressing the lignocellulosic material,
- Discharging the material from the first press,
- Impregnating the material with a sodium hydroxide alkaline peroxide solution and maintaining the impregnation for a reaction time.

Cannell et al teaches a typical BCTMP (bleached chemical thermomechanical pulp) flow process (Fig 2, bottom of page 9 of provided article) that includes a multistage impregnation with an aqueous solution of DTPA, hydrogen peroxide and caustic, a primary refining stage, and a bleaching stage following the primary refining stage prior to any other process stages. Cannell thus teaches that multistage pre-refining treatment with caustic and peroxide as well as post refining bleaching are typical steps practiced in the art.

Prusas discloses an alkaline peroxide mechanical pulping process comprising the steps of pretreating a lignocellulosic material by feeding a lignocellulosic material into a first press (col. 5, lines 5-12), pressing the lignocellulosic material (col. 5, lines 13-19); discharging the lignocellulosic material from the first press (col. 5, lines 13-19), impregnating the lignocellulosic material discharged from the first press with a first alkaline peroxide pretreatment solution (col. 5, lines 20-44) and maintaining the impregnation for a first reaction time (col. 5, line 65 - col. 6, line 7). Impregnation of

lignocellulosic material by pressing and then allowing an impregnating solution to be drawn into the material upon release of pressure in the manner disclosed by Prusas is generally known in the art.

The art of Haynes et al, Cannell et al, Prusas and the instant invention is analogous as pertaining to the art of producing bleached CTMP pulps. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to pretreat the lignocellulosic material by impregnation with an alkaline peroxide solution using the claimed steps in the pulping process of Haynes et al in view of Cannell et al and further in view of Prusas as a generally known treatment of lignocellulosic material. Including a multistage impregnation pretreatment of the lignocellulosic material would have been obvious as a typical process sequence, as taught by Cannell et al. Using the same sequence of steps for the second impregnation as for the first would also have been obvious as a generally known process.

Claim 5: Haynes et al discloses that the step of mixing (Fig. 3, item 336) is immediately followed by introducing the mixture into a separator (Fig. 3, item 338) and the separated pulp is then discharged into a retention vessel (Fig. 3, item 348).

Claim 6-7, 20-21 and 38: Haynes et al is not specific as to where in the blow line the alkaline peroxide treatment is added, but discloses addition of bleaching chemicals in the lines (Fig 2, 262) between the first refiner and process equipment following the first refiner. Absent data showing special properties derived from a particular point of addition in the blow line as compared to other locations in the line, it would have been obvious to one of ordinary skill in the art to add the treatment at any location within the

line, including near the blow valve or cyclone separator, as a functionally equivalent option.

Claims 9 and 10: Haynes et al does not disclose altering the temperature or consistency of the mixed pulp and alkaline peroxide. Absent data showing special properties derived from a particular temperatures and consistencies, it would have been obvious to one of ordinary skill in the art to maintain the temperature and consistency achieved in the refining for further refining or processing.

Claims 11 and 29: Haynes et al discloses that the bleaching liquor comprises chelating agents and/or silicates to stabilize the peroxide (col 9, line 56 to col 10, line 11). Keeping the peroxide solution at lower temperatures prior to treating the pulp would have been obvious to minimize the peroxide decomposition reactions.

Claims 44-49 and 51-52: Haynes et al, Prusas and Cannell et al do not disclose the relative amounts of sodium hydroxide alkaline peroxide solution added prior to refining versus post refining. The amount of bleaching chemical added to a pulp is a known result-effective variable related to the whiteness of the pulp. It would have been obvious to one of ordinary skill in the art at the time of the invention to determine, through routine experimentation, the optimum amounts of bleaching chemicals added at the various points in the process to obtain the desired whiteness and to obtain the claimed amounts. Alternatively, it would have been obvious to add similar amounts of bleaching liquor at each addition point before, during and after the refining step.

Claim 50: Haynes discloses that the pulp discharged from the refiner comprises steam that is separated in the separator, which separates the steam from the pulp

mixture (col 12, lines 5-14; col 13, lines 41-48). In Figure 2, the separator is block 218 and, in Figure 3, a two stage separator and pressure reducer is disclosed in blocks 328, 332 and 338. At least some of the separated pulp is moved by a conveyor to be retained in a vessel (Fig. 2, block 226, a surge vessel for rejected pulp; Fig. 3, block 348, a bleach vessel). Alternatively, as discussed above, contact time in the lines and vessels is controlled (the reaction mixture is retained) to produce a bleached material. The pulp in the bleach vessel can remain at the same temperature as at the exit from the cyclone (col 14, lines 3-4), which is at atmospheric pressure. Since the two stage separation and pressure reduction in Figure 3 separates steam from the process and the final pressure is atmospheric, it would have been obvious to maintain a pulp temperature below 100 °C to avoid further steam production and changing consistency of the pulp. Similar conditions in the other lines and vessels immediately following the separator would have been obvious. No change in consistency is disclosed, thus the pulp in the retention vessel remains at about 10% to 50%.

Claims 12-16 and 30-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haynes et al, Prusas, and Cannell et al, as applied to claims 1-2 and 21-22 above, and further in view of Textor (3,023,140), Sandstrom et al (4,270,976), and Xu (Xu, Eric C., "Chemical Treatment in Mechanical Pulping - Part 3; Pulp Yield and Chemical Pretreatment", 1998 Pulping Conference, TAPPI Proceedings, pp. 391-402, supplied by applicant).

The transition term "contains" is open-ended and must include at least the amounts of the reagents recited, but does not preclude other reagents or larger amounts of reagent. Therefore, the Examiner has considered the amounts claimed to indicate a lower end of a range of concentrations for each reagent.

Claims 12-16: Haynes et al discloses an acceptable alkalinity to hydrogen peroxide ratio in the bleaching liquor of about 0.25 to about 3 on a weight basis (col. 7, lines 2-4). The alkalinity limitation endpoints of claims 12-16 all fall within this range. Haynes also discloses adding a chelating agent, such as DTPA, in an amount of up to 10% by weight (col. 7, lines 7-18), which encompasses the claimed limitation endpoints of claims 12-16. Haynes further discloses use of sodium silicate up to about 10% by weight (col. 7, lines 32-33), which encompasses the limitation endpoints of claims 12-16. Additionally, Haynes et al discloses a suitable amount of hydrogen peroxide is 0.45% by weight to 9% by weight (10 to about 200 pounds per ton) based on dry pulp (col. 6, lines 62-64), which encompasses the limitation endpoints for claims 12-16, and also discloses a residual peroxide level of greater than 0.7% (col. 10, line 67 to col. 11, line 2), which also encompasses the limitation endpoints for claims 12-16.

Haynes et al does not disclose expressly the use of magnesium sulfate or residual alkalinity in the impregnating solution.

Textor discloses an alkaline peroxide mechanical pulping process (col. 3, line 73 to col. 4, line 1) in which magnesium sulfate is used to stabilize the peroxide bleach liquor (col. 3, lines 8-9). Textor discloses expressly a concentration of .05% magnesium sulfate (col. 3, lines 4-6), which contains one specific point within the claimed range of

the 1st impregnation solutions of claims 14, 15, and 16, and within the 2nd impregnation fluids of claims 15 and 16.

Sandstrom et al discloses an alkaline peroxide mechanical pulping process (col. 1, lines 9-20) in which magnesium sulfate is added to the bleach liquor in an amount of 0.1 to 0.5% of the dry lignocellulosic material (col. 3, lines 4-13), which encompasses the claimed limitation endpoints of the second impregnation solutions of claims 12 and 13, and the intermediate line solutions of claims 12, 13, and 14. The range disclosed by Sandstrom et al also contains two specific points within the claimed ranges of claim 14, 1st and 2nd impregnation solutions, claim 15, 1st and 2nd impregnation solutions and intermediate line solution, and claim 16, 1st and 2nd impregnation solutions.

Xu discloses a total alkalinity residual of 0.1% in a 1st impregnation stage and 1.3% in a 2nd impregnation stage (p. 397, Table II, rows 4 and 7), and a total "total alkalinity" residual of up to 3.1 (p. 398, Table III, row 17), which contains at least one specific point within the claimed ranges of claims 12-15, intermediate line solutions.

The art of Haynes et al, Prusas, Cannell et al, Textor, Sandstrom et al, Xu and the instant invention is analogous as pertaining to the art of producing bleached CTMP pulps. Absent data showing special properties derived from the particular claimed compositions as compared to broader disclosures in the prior art, it would have been obvious to one of ordinary skill in the art to use magnesium sulfate as described by Textor and Sandstrom et al as a functionally equivalent option and to optimize the amount of magnesium sulfate to obtain the most efficient use of the reagent as a stabilizer for the peroxide solution (Textor, col. 3, lines 8-9). The amount of peroxide is

a known result effective variable and it would have been within the capability of one of ordinary skill in the art to optimize the concentration of peroxide, and thereby the sodium hydroxide and stabilizer, in the bleaching liquors to provide the greatest whitening effect. Obtaining the claimed residual alkaline and peroxide would also result from the optimization.

Claims 30-34 are treated similarly to Claims 12-16.

(10) Response to Argument

Applicant argues that Haynes et al substitutes another alkali for most or all of the sodium hydroxide at every point where AP might be introduced.

Haynes discloses partially or completely substituting a differing alkali for NaOH (col 5, lines 41-45). In other embodiments, Haynes et al discloses using replacement of from 0-100 wt-% of the NaOH with magnesium hydroxide or soda ash and suitably from 40-100 wt-% (col 4, line 64 to col 5, line 3; col 6, lines 19-23 and 44-56). The disclosure thus embodies treatment using NaOH or mixtures of NaOH with other alkaline materials. Note that the instant claims do not prohibit non-NaOH alkaline materials with the NaOH. Regarding the temperatures of pressurized refiners, Haynes et al discloses addition of the AP materials before, in and/or after the refiner.

Applicant argues that Haynes et al does not disclose the synergy of post-refiner AP treatment and upstream AP impregnation and that there is no basis to motivate adding expensive equipment for pre-refiner pressing. Applicant further argues that the examples of Haynes et al do not introduce AP upstream of the refiner. Although Haynes et al does not disclose pre-refiner impregnation, pre-treatments are not

discouraged. Applicant admits on p 12 that the field of AP mechanical pulping processes is crowded, with many variations on the pretreatment, refining, and post-refining stages and that there is a continual effort at improvement. Motivation is thus high to seek improved processes. Applicant argues that practitioners cannot expect improvement over one process by arbitrarily picking from among sub-features of other references. Applicant believes that improper hindsight was used in combining the references as outlined in the rejections.

Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments. In re Susi, 440 F.2d 442, 169 USPQ 423 (CCPA 1971). In Figure 2, Haynes et al discloses a first addition of bleaching chemicals before or at the refiner and a second addition at vessels, cyclone cleaner, conveyors (Fig 2, blocks 218, 258, 226, 230) and all lines connected to such blocks, including after the primary refiner and prior to additional refining (Fig 2, item 262) (col 12, lines 39-62). Haynes et al discloses similar points for addition of the bleaching chemicals in Figure 3, such as at cyclone block 328 and all lines into or leaving the block (col 13, lines 48-64). None of the disclosed locations is criticized, discredited, or otherwise discouraged. The instant Specification fails to provide examples of any unobvious results from introducing the chemicals immediately after the blow valve. Absent convincing evidence of unexpected advantages derived from introducing the chemicals immediately after the blow valve, the claimed introduction point would have been obvious to one of ordinary skill in the art over the disclosure of Haynes as a functionally equivalent option with a reasonable expectation of success. In

addition, the blow line is a location of high turbulence and, therefore, optimum mixing. Adding bleaching chemicals at a point of high turbulence would have been obvious to promote thorough mixing with the pulp.

The order listed of combining the references does not negate their teachings, but simply arranges them in a logical fashion to best explain the rejection. Haynes et al teaches improvements to pre-refiner, in-refiner and post-refiner bleaching. Cannell et al teaches that both multiple alkaline peroxide pre-refiner impregnation bleaching steps and post-refiner bleaching prior to other processing steps are typical steps in a BCTMP process generally known to those of ordinary skill in the art (Fig. 2). Prusas provides details of the pre-refiner impregnation stages. Thus, Cannell et al establishes a nexus between Haynes et al and Prusas. Why would it not have been obvious to one of ordinary skill in the art to use pre-refiner impregnation bleaching steps in the manner of Prusas, and in-refiner and post-refiner bleaching as taught by Haynes et al as a typical bleaching and refining combination well known in the art and to have a reasonable expectation of success?

Applicant argues that Cannell et al teaches away from AP bleaching in pressurized refining systems. Cannell et al states on p 1 that APP differs from BCTMP in that peroxide is used to impregnate chips instead of sodium sulfite. Since APP is alkaline peroxide pulp, the use of peroxide is obvious. However, Cannell et al also teaches in Fig. 2 that the impregnation chemicals in a typical BCTMP process can be either sodium sulfite or hydrogen peroxide and caustic. Thus there is no teaching away from the claimed impregnation process.

Applicant argues that Cannell et al implies in the last paragraph that the APP process needs high front end loading of the AP. In the last paragraph of the Technology Update, Cannell suggests that a high loading of AP in the front end may offset energy savings due to higher chemical costs, thereby teaching one of ordinary skill in the art that optimization may be required of the split between impregnation and post-bleaching stages. The amount of bleaching chemical used in a given bleaching step affects the brightness of the pulp, thus is a result effective variable (see Villaume et al, 4040743, col 1, lines 19-24 for instance, if evidence is needed). Optimizing the amounts of NaOH AP used in a bleaching step, or between two or more bleaching steps, to achieve a desired whiteness of the pulp, would have been within the capabilities of one of ordinary skill in the art through routine experimentation.

Regarding the argument against Prusas under the Claims 2, 22 and 52 headings (pp 17, 19 and 22), in one embodiment specifically recited the chips are simply allowed to drain from the alkaline liquor impregnation, thus some of the alkaline liquor remains impregnated in the pulp during the second impregnation stage with sulfite treatment (col 6, lines 8-16). Alternatively, Cannell et al teaches that multistage impregnation pretreatments with sodium sulfite or alkaline peroxide are typical. Using the same sequence of steps for the second impregnation as for the first would also have been obvious as a generally known process.

Regarding the argument against Haynes et al under the Claim 6, 20, 21 and 38 headings (pp 18-20), no convincing evidence of unobvious results has been provided from introducing the chemicals in the blow line immediately after the blow valve. The

claimed introduction point, where the greatest turbulence and hence mixing, occurs would have been obvious to one of ordinary skill in the art to obtain good mixing of the bleaching chemicals with the pulp.

Regarding the argument against Cannell et al under the Claim 28 heading (p 19), the BCTMP process, which uses pressure refining, has been discussed previously.

Regarding the argument under the Claim 42 heading (p 20), the feed to the refiner is in the form of wood chips, which have obviously been subject to comminution (a kind of refining) to create them from the original trees. Prior processing through a disc refiner is not claimed, nor is prior stage refining of material that had been pretreated and impregnated with NaOH AP. Rather prior refining and pretreatment with NaOH AP are claimed as two prior processes but not performed in any particular order.

Regarding the arguments under the Claims 44-49 and 51 headings (pp 21-22), optimizing the amounts of NaOH AP used between two or more bleaching steps would have been within the capabilities of one of ordinary skill in the art through routine experimentation.

Regarding the arguments under the Claim 50 heading (p 22), the features are discussed in the rejections with reference to Haynes et al.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Dennis Cordray/

Examiner, Art Unit 1791

Conferees:

/Steven P. Griffin/

Supervisory Patent Examiner, Art Unit 1791

/Jennifer Michener/

QAS, TC1700